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ELKADER BRIDGE
(Keystone Bridge)
Iowa Bridges Recording Project
Spanning Turkey River at Bridge Street
Elkader
Clayton County
Iowa

HAER No. IA-47

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HISTORIC AMERICAN ENGINEERING RECORD
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ELKADER BRIDGE
(Keystone Bridge)

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Location: Spanning Turkey River, on Bridge Street,
Elkader, Clayton County, Iowa.
UTM: 15.630430.4745740
USGS: Elkader, Iowa quadrangle
(7.5 minute series, 1964)

Date of Construction: 1888-89

Designer: M. Tschirgi Jr.

Contractor: Byrne and Blake

Present Use: City Street Bridge

Significance: The Elkader Bridge, built in the second
half of the nineteenth century, is an
exceptional example of American stone
masonry. The bridge has a total length
of 189 feet, having two arches each
spanning 80 feet, making it one of the
longest stone arch bridges west of the
Mississippi.

Historian: Juliet Landler, engineer, August, 1995

Project
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Project during the summer of 1995 by the
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Fraser of Fraserdesign, Loveland, CO.

Constructed in stone, the Elkader Bridge was built to endure. Conceived as a reliable replacement for a deteriorated iron truss, the Keystone Bridge, as it is known locally, has maintained a vital farm-to-market link for over a century without fail. Spanning the Turkey River in Clayton County, it played a pivotal role in the area's economic development. With its two spectacular stone arches, it is a source of pride for residents, as well as an important transportation link.

Long before Europeans laid claim to the land surrounding Elkader, the Fox and Sac tribes roamed the territory. After the Black Hawk Purchase opened this territory to settlers in 1833, fur trappers came, attracted by the abundant wildlife, woodlands, and water. In 1838, the first survey recorded Elisha Boardman as having the settlement furthest upstream on the Turkey River. His home was only yards from where the Keystone Bridge stands today.¹ The population of Clayton County in 1838 was only 274 people.²

The city of Elkader was not officially founded until 1845, when John Thompson, Chester Sage, and Timothy Davis came from the East Coast by way of Dubuque, and established a saw mill on the western bank of the Turkey River near the homestead of the Elisha Boardman. These founding fathers laid out a town in the grid form it retains to this day. Contrary to the orthogonal boundary lines of the territory's townships and counties, Thomas, Sage, and Davis skewed the grid 45 degrees so that the streets would run parallel and perpendicular to the Northwest/Southeast course of the river. By this time the area's reputation for fertile fields had already spread, and farmers outnumbered trappers. Early settlers had much success growing wheat and Thompson, Sage, and Davis were obliged to add a grist mill to their original sawmill. Before long, they had so much flour that ferrying it across the river had become a problem. They decided that a bridge was necessary and made a request to town officials.³ In 1851 they responded with the construction of city's first bridge, an

¹Anderson, David C. "Reconnaissance Survey of Elkader, Clayton County, Iowa." Prepared for Clayton County Historic Preservation Commission, March 1, 1994.

²Ibid.

³Anderson, David C. "Reconnaissance Survey of Elkader, Clayton County, Iowa." Prepared for Clayton County Historic Preservation Commission. 1994.

iron truss, located just downstream from the grist mill.⁴ With the bridge in place, the town limits expanded across the river in 1853, and new residents began building their homes on the eastern bank of the Turkey. Elkader continued to prosper, and in 1867, it was named county seat. In industry, Elkader rivalled the larger towns of Northeast Iowa, such as Guttenberg, the Mississippi river port, and Garnavillo, a major stop on the Dubuque - Prairie du Chien - St Paul Railroad. However, its size remained small, and Elkader's success was due mainly to the growth of the surrounding community. By 1860, the town's population had reached only 440 residents, while the rest of the Clayton County had grown from 6,318 in 1852 to 20,728 in 1860.

The early Elkader Bridge was an iron bridge of Truesdell patent design. It was poorly constructed and suffered badly under the ever increasing loads of this growing community. The bridge constantly needed repair and strengthening. As soon as one end was fixed, the other end would fall into disrepair costing the town much money and causing much frustration.⁵ Indeed, the structure was often cited in the 1860s as being a hindrance to the town's economic development. Seeking an alternative to the area's unreliable bridge and shoddy roads, many members of the community sought to invest in steamboat transport to bring their goods to the Mississippi River. However, the venture failed when the Turkey River proved unnavigable. Resigned to land transport, county residents refocused their energies into building a better road to the Mississippi. Its new path began in the southwestern corner of the county, passed over the bridge in Elkader, and continued on to Clayton, the nearest Mississippi port.⁶ Although altered slightly from its original alignment, this road, since named Route 13, remains a major artery for the county.

In 1888, the Clayton County Board of Supervisors hired M. Tschirgi Jr., a respected civil engineer from the city of Dubuque, to assess the condition of their troubling bridge. After a thorough examination, he submitted the following evaluation on June 6,

"As a result of my inspection of the bridge over the Turkey River in Elkader, I would respectably state that

⁴"Old Stone Arch Bridge Built in Nine Months; Completed Aug. 15, 1889." Clayton County Register, July p.1

⁵Ibid. and Swisher, Jacob. Iowa: Land of Many Mills. The State Historical Society of Iowa. 1940, p.94.

⁶Route 13 now bypasses the Elkader bridge, but crosses a new bridge nearby.

the superstructure, consisting of four spans of Truesdell design, aggregating 202 feet in length is both faulty in design and in very poor condition to withstand the maximum load usually allowed for highway bridges, and judged by the standard of the specifications for iron highway bridges, it would be condemned."⁷

Tschirgi stated that this type of bridge, even in perfect condition, could only carry 50 pounds per square foot, due to the faulty design of Truesdell. This bridge in its current condition could fail under even less load. Heeding his advice, county supervisors condemned the old bridge immediately.⁸

Although the county supervisors publicly solicited bids on any type of replacement structure, they had established one prerequisite privately - above all else, the bridge should require as little maintenance as possible. They ruled out iron bridges. Typically, such structures had wood floors which needed to be replanked each year at great expense. They also demanded repainting, another expense. Moreover, their skeletal frames were light and prone to being washed out by floods. A wood bridge was hardly better. Timber had grown scarce, and building such a span in wood would be expensive and complicated. Steel and concrete were not yet commonly used. That left one option for the board of supervisors: a stone bridge. The decision was not difficult to rationalize. Nearby, Cole's quarry had a great supply of high quality magnesium limestone, which was resistant against the action of frost and water. A stone arch bridge would also be heavy and immovable in high waters. With an asphalt floor, it demanded almost no maintenance.⁹

As soon as Tschirgi filed his report, the board rehired him to draw up the plans for a stone arch bridge, located in the same site as the existing bridge. Once the bids were received, the county supervisors felt even more justified. The estimate for Tschirgi's double arched stone bridge was less expensive than bids for iron bridges of the same width and strength. The firm of Byrne and Blake, a team of contractors and stone masons from

⁷"The Engineer's Report", The Register. June 1888; reprinted in "Old Stone Arch Bridge Built in Nine Months; Completed Aug. 15, 1889." Clayton County Register. July 1936.

⁸"The Engineer's Report", The Register. June 1888.

⁹"Stone Arch Highway Bridge over the Turkey River, Elkader, Ia." Engineering News. April 11, 1891. 338.

Dubuque, won the contract to build the stone bridge for \$13,000.¹⁰

The theory ruling the design of stone arch bridges is much the same as it was in ancient times. However, the tools and equipment have changed dramatically. Tschirgi's plans called for two identical arches each with spans of 84' and rising 27.9'. The center pier was at 19' across at the foundation. The total length of the bridge measured 246', and the outside width was 34'. The clear width of 30' allowed for two lanes of traffic, and a sidewalk 6' wide. Its weight was estimated at 18,618,255 pounds. Having assembled a large force of local labor, work began without delay the month of August. By Thanksgiving, the first arch was completed and the town held a great celebration the day the keystone was placed.¹¹

After the first season of construction, the work force was reduced and the second arch was not finished until the following summer. The old truss bridge was maintained during the entire construction process, supporting formwork for the new structure and providing public passage between the town's two halves.¹² Work progressed smoothly throughout the erection of the bridge -- no accidents or injuries were reported during its construction.¹³ Problems, however, were encountered in transporting stones from the quarry. Since the quarry was located near the river's edge, the builders thought the stones could be moved by water. This proved difficult as many of the stones rolled from the bluffs, today known as Lover's Leap, ended up in the water. The final cost of the bridge exceeded the estimate by a few thousand dollars, coming to a total cost of \$16,282.49.¹⁴ The extra costs incurred included additional wing walls, planking for the sidewalk, coping, and caps. The local paper, The Register, which printed the itemized list of additional expenses, also recorded a fee of \$502.25 to the civil engineer, M. Tschirgi, Jr.¹⁵

¹⁰ Ibid.

¹¹"The Bridge!" The Register. August 22, 1889.

¹²"The Bridge!" The Register. August 22, 1889.

¹³Engineering News. 338.

¹⁴"Old Stone Arch Built in Nine Months; Completed Aug. 15, 1889." Clayton County Register. July 1936, reprinted July 21, 1971.

¹⁵"The Bridge" The Register. August 22, 1889.

This was not the only monumental project undertaken by the city of Elkader during this period. During the last two decades of the nineteenth century, the city was involved in several civic works: building a municipal water plant, a hydroelectric plant, a county asylum for the insane, and installing telephone and telegraph service. While the Keystone Bridge is perhaps the most visible display of the craftsmanship of local stonemasons, the area affords two other examples of their skills. The Motor Mill, completed in 1869, is located five miles downstream from the bridge. This mill is six stories tall, and built entirely of limestone. The walls of the structure at river level are five feet thick tapering to three feet. St. Joseph's Catholic Church is also constructed of native limestone. The present church, completed in 1898, replaced a smaller church erected a few feet away and forty years earlier. The town of Elkader almost doubled its size from 1860 to 1880. Its population continued to grow, increasing again by over 50% between 1880 and 1900. The census records 1312 residents for that year. Since the turn of the century, growth has slowed. The 1988 census reported a population of 1688 for Elkader.¹⁶

The Elkader Bridge has required minimal maintenance in over one hundred years of service. The bridge was altered in the early 1970s, when the interior sidewalks were removed and one new sidewalk was added to the upstream side. The Elkader Bridge continues to carry traffic and serves as the major crossing for the area. On the date of its completion, August 22, 1889, the city celebrated and the local paper declared it to be, "the finest stone arch highway bridge west of the Mississippi River." More than one hundred years later that distinction still rings true.

¹⁶David C. Anderson, 5.

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